PILOT STUDY WORK PLAN
NAVISTAR INTERNATIONAL TRANSPORTATION CORPORATION
BURLINGTON NORTHERN RAILROAD/ IOWA INTERSTATE RAILROAD PROPERTIES
ROCK ISLAND, ILLINOIS

April 1995

Prepared for

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CONTENTS

Page

INTRODUCTION 1

PROPOSED REMOVAL ACTION 2
PILOT STUDY OBJECTIVES 2
ORGANIZATION OF WORK PLAN 4

WELL INSTALLATION 4

TEST BORINGS 5
OBSERVATION WELLS 6
MONITORING WELL 6
RECOVERY WELLS 6

Slug Tests 7
Product Thickness Measurements 7
Recovery Well Construction 8

AQUIFER TEST 8

AQUIFER STEP TEST 9
VACUUM ENHANCED STEP TEST 9
INITIAL CONSTANT RATE PUMP TEST 10
RECOVERY TEST 13
SECOND CONSTANT RATE PUMP TEST 13
GROUNDWATER SAMPLING 14

ANALYSIS OF PUMPING TESTS 15

REFERENCES 17

TABLE

1. List of General Water Quality Parameters, Navistar/BNR/IIR Site, Rock Island, Illinois.

FIGURES

1. Test Borehole Locations, Navistar/BNR/IIR Site, Rock Island, Illinois.

2. Proposed Configuration of Observation Wells Around Pumping Well E-RW, Navistar/BNR/IIR Site, Rock Island, Illinois.

3. Effect of Imposed Vacuum on Drawdown at the Well, Navistar/BNR/IIR Site, Rock Island, Illinois.

4. Predicted Drawdown for High Transmissivity Case, Navistar/BNR/IIR Site, Rock Island, Illinois.

5. Predicted Drawdown for Low Transmissivity Case, Navistar/BNR/IIR Site, Rock Island, Illinois.

APPENDICES

A. Addendum to Sampling and Analysis Plan, Navistar/BNR/IIR Site, Rock Island, Illinois.

B. Access Agreement for Pilot Study Activities, Navistar/BNR/IIR Site, Rock Island, Illinois.

INTRODUCTION

This Pilot Test Work Plan has been prepared to describe the aquifer pumping test to be conducted by Navistar International Transportation Company (Navistar) and the Burlington Northern Railroad (Respondents) towards completion of their obligations under the terms and conditions of the Administrative Order on Consent (AOC) entered with the U.S. Environmental Protection Agency (USEPA) for removal actions associated with the Navistar, Burlington Northern Railroad (BNR) and Iowa Interstate Railroad, Ltd (IIR) properties (Navistar/BNR/IIR site) located in Rock Island, Illinois.

Geraghty & Miller, Inc. (Geraghty & Miller) prepared a work plan on behalf of the Respondents for Phase II soil and groundwater investigation activities, which was entitled, "Work Plan Phase II Site Investigation, Navistar/BNR/IIR Properties, Rock Island, Illinois" (Phase II Work Plan). The Draft Phase II Work Plan was submitted to USEPA for agency review on June 7, 1994. The Final Phase II Work Plan, which incorporated review comments received from the USEPA, was approved by the agency on July 6, 1994 in correspondence addressed to Geraghty & Miller. The Phase II site investigations were conducted during the period from July through September 1994.

Geraghty & Miller prepared a draft report on the Phase II investigations, on behalf of the Respondents. The draft report, which was entitled, "Phase II Site Investigation Report, Navistar/BNR/IIR Properties, Rock Island, Illinois" (Phase II Report) was submitted to the USEPA for review on October 10, 1994. The agency completed its review and issued an approval of the Draft Phase II Report in correspondence to Geraghty & Miller dated February 10, 1995. USEPA's approval of the Draft Phase II Report is contingent upon the Respondents' response to the agency's review comments transmitted with the February 10, 1995 letter. Geraghty & Miller has prepared responses to each of the agency's review comments and submitted a Final Phase II Report to the USEPA under separate cover (see Geraghty & Miller letter dated April 15, 1995 to Mr. Kenneth Theisen of the USEPA).

PROPOSED REMOVAL ACTION

Based on the data collected during the Phase II site investigations and the analysis presented in the Phase II Report, the Respondents have recommended that an active groundwater recovery and treatment system (Alternative 2) be installed at the Navistar/BNR/IIR properties to prevent the discharge of free product to the Sylvan Slough. Alternative 2, as described in the Phase II Report, consists of the following major elements (Geraghty & Miller 1994):

1. Performance of a site-specific pilot test to verify the preliminary well analysis (Appendix F) presented in the Phase II Report.

2. Design and installation of a line of recovery wells along a transect running parallel to the Sylvan Slough.

3. Design and installation of a common header pipe to convey recovered total fluids (free product and groundwater) to a centrally located, on-site treatment system, consisting of oil/water (O/W) separation and liquid-phase granular activated carbon (GAC).

4. Implementation of a groundwater monitoring program.

A description of the activities that will be conducted during completion of the first item listed above is presented in this Pilot Test Work Plan.

PILOT STUDY OBJECTIVES

The objectives for the additional field investigation, well installation, and pumping test associated with the scope of the pilot study proposed in this work plan include the following:

- Determine the aquifer hydraulic properties of the unconfined aquifer near the bank of Sylvan Slough where hydrocarbon-contaminated water is discharging to the river; and

- Determine the feasibility of remediating the site by means of a line of recovery wells installed along a transect running parallel to the Slough at a distance approximately 50 feet south of the Slough. The parameters obtained from the aquifer tests will indicate, first if pumping is feasible at the site and, second, the number, placement and discharge rates of recovery wells needed to intercept the movement of affected groundwater to Sylvan Slough.

The objectives will be met by performing tests that stress the shallow groundwater system by pumping water from a set of newly installed pumping wells. The site presents the following special features that must be accounted for during the aquifer tests and subsequent data analysis:

- The pronounced heterogeneity near the water table (native channel deposits/overbank deposits, fill material) may cause the aquifer's response to differ markedly from location to location and to deviate from the cone of depression expected under homogeneous conditions;

- The presence of free product near the water table during the tests could interfere with the normal evolution of the drawdown cone around the pumping well;

- The existence of a strong hydraulic connection between the Sylvan Slough and the aquifer could result in the Slough acting as a recharge boundary during the tests and possibly limit drawdown; and

- Freight train movement in the vicinity of the test sites could temporarily compact sediments and cause drawdown/recovery cycles that complicate data analysis.

The proposed pilot test design addresses these problems. In particular, the presence of heterogeneity will be addressed by collecting grain size samples and conducting slug tests at three

locations along the planned transect of recovery wells, and by attempting to conduct pumping tests at two locations along the line.

ORGANIZATION OF WORK PLAN

The Pilot Study Work Plan presented herein is divided into five sections of text including the reference section, each of which is briefly described below. Geraghty & Miller has also included several figures and appendices in the Pilot Study Work Plan that support the discussions presented in the main body of the text. A brief description of each section of the text is presented below.

Introduction describes the proposed removal action for product recovery at the site, and identifies the objectives of the pilot study.

Well Installation presents the rationale for the selection of the locations for the two aquifer pumping tests proposed for the site. This section also identifies the number and location of observation wells and additional monitoring wells to be installed as part of the pilot study.

Aquifer Test discusses the field procedures and monitoring schedule for the aquifer step test and constant rate pumping tests proposed for the site.

Analysis of Pumping Tests discusses the qualitative and quantitative methods that will be used to analyze the data obtained from the aquifer pumping tests.

WELL INSTALLATION

This section of the Pilot Study Work Plan discusses the additional drilling and well installation activities that will be conducted at the site prior to performing the aquifer pumping tests. The rationale that will be used to locate the two new aquifer test wells is also described. The additional well installation activities will be conducted in accordance with the field

procedures identified in the approved Sampling and Analysis Plan (SAP) for the site (see Appendix A of June 1994 Phase II Work Plan Prepared by Geraghty & Miller).

TEST BORINGS

A number of test borings will be drilled as trial sites for recovery wells to be used in the aquifer pumping tests. The test borings will be used to characterize the hydrogeology in the vicinity of the water table at three locations by using grain-size analysis and slug tests to identify the location likely to have the ***highest*** transmissivity and the location likely to have the ***lowest*** transmissivity. Pumping wells will be installed at these high and low transmissivity sites. The two pumping tests subsequently conducted will provide a reliable range for the hydraulic conditions that can be expected for the full array of recovery wells (expected to number from five to ten) which eventually will be installed to intercept movement of hydrocarbon-impacted water.

The locations of the three trial boreholes are shown on Figure 1. The choice of locations is constrained by two concerns: (1) a pumping well should not be placed too close to the railroad tracks, lest train movement complicate the analysis of the pumping tests; and (2) a pumping well should not be located too close to MW-9, which has contained a thick layer of free product (as much as 6.5 feet) in the past. However, it must be understood that it is very possible that one, two or all three of the trial boreholes may penetrate areas with significant thickness of free product floating on the water table. Contingency plans for addressing the presence of free product are described in a later section on recovery well installation.

The borings will be installed using six-inch inside diameter (I.D.) hollow-stem augers (HSA) to a depth approximately 12 ft below the water table (about 25 to 30 ft below land surface). The borings will be advanced to that depth or until bedrock is encountered . The three trial boreholes are designated as E-5, C-5 and W-5 to denote position (eastern, central or western side of proposed line of remedial wells) and to indicate that pumping wells will be installed five feet south of these locations (two locations only).

Soil samples will be collected from each boring for grain-size analysis from four approximate depths within the unconsolidated zone: near the water table and 5, 10 and 15 feet below the water table. They will be used to provide a preliminary estimate of the permeability by depth in the vicinity of the borehole, and to allow for construction of an efficient recovery well in the vicinity of the borehole by providing a basis for proper selection of filter pack material and screen slot size.

OBSERVATION WELLS

Observation wells for use during the aquifer pumping test(s) will be installed in each of the test borings. All three boreholes will be finished as water table observation wells with 15-foot screens positioned from approximately three feet above the water table to 12 feet below the water table or until bedrock is encountered. Standard Schedule 40 PVC casing, filter pack, bentonite seal, PVC screen and slot size (10 slot) will be used in a two-inch diameter Schedule 40 casing. The observation wells will be developed by surge block and bailing (15 minutes per well) after installation.

MONITORING WELL

A water-table monitoring well (GM-20) will be installed approximately 60 feet downgradient (north) of the proposed line of remedial wells and 20 feet upgradient (south) of the Slough. The location is shown on Figure 1. The monitoring well will serve to record the effect of changes in river stage on background water levels. The construction and development of this well will be the same as described for the observation wells. An automatic staff gauge, consisting of a pressure transducer connected to a Hermit data logger, will be installed in the Slough directly to the north of GM-20 to measure changes in river stage prior, during and after the pumping tests.

RECOVERY WELLS

After completion of the grain-size analysis by a soils testing laboratory, standard methods (F.G. Driscoll, Groundwater and Wells, 1986) will be used to design the pumping wells. The grain-size distribution curves will also be subjected to permeability analysis using empirical formulas (M. Vukovic and A. Soro, Determination of Hydraulic Conductivity of Porous Media from Grain-Size Composition,

1992). These results will be used to identify the highest and lowest transmissivity locations from among the three test boreholes.

Slug Tests

Once the grain-size analyses have been completed slug tests will be conducted on observation wells E-5, C-5 and W-5 as well as on the background monitoring well GM-20. The slug tests results will be examined on-site to provide an estimate of the relative permeability at each observation well. They will also be analyzed later by the method of Bouwer and Rice to quantify the hydraulic conductivity. Together with the grain-size analyses, the slug test results will be used to select the high and low transmissivity locations. The slug testing procedure is described in Appendix A (Addendum to Sampling and Analysis Plan) of this work plan.

Product Thickness Measurements

During this phase, samples of free product will be collected , if possible, from one of the newly installed observation wells and from MW-9 and GM-6 (wells that have shown significant product accumulation in the past). The specific gravity of the free product samples will be determined. The specific gravity value can then be used to correct water-level measurements obtained from wells affected by free product accumulation.

A Keck™ oil/water interface probe will be used to measure product thickness at E-5, C-5 and W-5. Pumping wells will be constructed at the high and low transmissivity locations ***if*** there is less than one inch of product in the corresponding observation wells. If a location shows more than one inch of free product, then that location will be rejected as a pump test well site. If only one of the three locations contains less than one inch of product, then a single recovery well will be installed at that location and only one pumping test will be conducted. If all three observation wells show more than one inch of product, then the location with the least product will be used to site a single pumping well. Under these circumstances, however, it is possible that the accuracy of the aquifer parameters calculated from the pumping test data will be compromised.

For the remainder of this work plan, it is assumed that two pumping wells will be installed and that one is installed in material characterized chiefly by sand or silty sand, and the other by finer grained material.

Recovery Well Construction

The two pumping test recovery wells will be installed five feet to the south of two of the previously installed observation wells. Twelve-inch diameter boreholes will be advanced using wash boring methods to a depth of approximately 17 feet below the water table. Six-inch diameter PVC casing will be installed in the holes. The casing will be finished with a 15-foot PVC screen and a five-foot sump. The top of the screen will be placed three feet above the water table elevation and will extend to the same depth as the observation well screens.

Two additional water table observation wells will be installed in the vicinity of each pumping well location. One will be located 15 feet to the east or west of the pumping wells and the other 30 feet to the south. If for example, these wells correspond to the eastern-most borehole, they will be given the designations E-15 and E-30 (as in Figure 2). The corresponding C or W designations will be used if the central and/or western locations are selected.

The wells will be constructed and developed using the same procedures as the previously installed observation wells located five feet from the pumping wells.

AQUIFER TEST

This section of the Pilot Study Work Plan describes the aquifer pumping tests that are proposed for the Navistar/BNR/IIR site. Aquifer pumping tests are planned at two separate test well locations. The test wells will be located in a ***high*** transmissivity and a ***low*** transmissivity zone, as determined by the test boring program. Aquifer step and 48-hour constant rate pumping tests will be conducted at each of the two test well locations. The aquifer pumping tests at the ***low*** transmissivity test well will be performed under vacuum-enhanced conditions.

AQUIFER STEP TEST

A two to four hour step test will be conducted in each pumping well. The purpose of the step tests is to select a suitable sustainable discharge rate for the constant rate pumping tests. The step test is valuable because it shows the effects of casing storage and well inefficiency on drawdown in the well. Well inefficiency can lead to drawdown in the well that is much greater than that which would be produced by head loss in the aquifer alone. If it is not considered, then the planned pumping rate for the aquifer test might be too high to sustain.

Depending on the type of aquifer material penetrated by the pumping wells, the step tests will be conducted at rates of 0.2, 0.5, 1.0, 2.0 and 5.0 gpm. Each rate will be maintained for approximately 20 minutes. Qualitative examination of the drawdown curves produced by the step tests will provide an indication of the highest pumping rate that can be sustained for a multiple-day test.

VACUUM ENHANCED STEP TEST

It is possible that a pumping test in relatively low-permeability material will not sustain even 0.2 gpm, the lowest rate which can be discharged continuously with available pumps. Given this possibility, we propose to use a vacuum-enhanced discharge system to conduct the step test at the less transmissive location. When a vacuum is applied to the well head, it initially causes water to move toward the well where a mound forms. Within a short time (generally several hours), the water table mound stabilizes (Figure 3). The new static condition can be used as the starting point for subsequent step tests and pumping tests.

The advantage of this procedure is that it allows for greater drawdown in the well and, thereby, counteracts inefficiency. It also preserves the saturated thickness around the well which is important when trying to maximize pumping from wells in unconfined aquifers.

A trailer-mounted test unit equipped with two Rotron regenerative blowers with a combined capacity of 100 inches of water column ("w.c.) will be used to apply the vacuum. This vacuum

arrangement will allow the pumping well to sustain an additional four to eight feet of drawdown with respect to the non-vacuum condition. Past experience suggests the following sustainable pumping rates in the absence and presence of a vacuum, for a well screen initially penetrating the top 10 feet of an unconfined aquifer:

Material	*Hydraulic Conductivity (cm/sec)*	*Discharge Rate (gpm)*	
Silty sand	1E-3	0.4 - 2	No vacuum
Silt	5E-5	0.02 - 0.1	No vacuum
Silty sand	1E-3	2 - 10	4-8 feet vacuum
Silt	5E-5	0.1 - 0.5	4-8 feet vacuum

The additional discharge produced under a vacuum allows for the use of pumping wells screened near the water table to contain affected groundwater even at sites underlain by fine-grained material. It is, therefore, a high priority to test this technology at the site both during one of the step tests, and one of the pumping tests.

A written request for permission to discharge directly to the sanitary sewer system for the duration of the pilot study will be submitted to the Rock Island, Illinois Public Works Engineering Division for review. Alternatively, the pilot study liquid (groundwater) will be containerized on-site in two 20,000-gallon closed-top Baker™ tanks and subsequently transported to a commercial treatment facility or another nearby Publicly Owned Treatment Works (POTW). Based on an estimated 10 gpm flow rate and 48-hour test duration, the pilot study is expected to generate approximately 30,000 gallons of liquid (groundwater).

INITIAL CONSTANT RATE PUMP TEST

The two pumping tests will be performed consecutively. Depending on the locations chosen for the pumping wells, it is possible that MW-9 or MW-6 will be influenced by pumping. However, at

the low discharge rates anticipated, it is unlikely that GM-20 will be affected, since it is at least 150 feet from the nearest borehole location. MW-8 is also outside the anticipated cones of depression.

The automatic data logger at the staff gauge on the Sylvan Slough will be activated 24 hours before the test. Barometric pressure on site will be measured approximately every four hours during the background period. Before the background period, automatic data loggers will be placed in the pumping well and the observation wells and in GM-20. The other background wells will be measured only manually. Static water levels will be measured manually in the pumping, observation, and background wells no more than two hours before the start of the test. A Keck™ oil/water interface probe will be used to determine the static thickness of free product at these locations. Because data loggers often fail, their measurements will be supplemented by manual measurements throughout the pumping test.

The anticipated pumping rate at the high transmissivity site is 0.5 to 2 gpm. Figure 4 shows the predicted drawdown for a system characterized by a horizontal hydraulic conductivity (K) of $1x10^{-3}$ cm/sec, a ratio of horizontal to vertical K (i.e., anisotropy) of 10, an initial saturated thickness of 10 feet and a pumping rate of 1 gpm. The solution is obtained using the method of Neuman and the computer code developed by Moench and distributed by the USGS. Note that the early-time portion of the drawdown curve is expected to end after the first several minutes of the test and that the late time portion of the curve is expected to begin approximately 1000 minutes into the test. The late-time part of the curve can be used to calculate the transmissivity (T), the specific yield (Sy) as well as horizontal K. The earlier flat part of the curve can be used to estimate the vertical K.

The possibility of free product accumulation in the observation wells means that special measures must be taken to insure that the water -level observations reflect aquifer properties . A 1.5-inch diameter drop tube will be inserted into each observation well and lowered to the bottom of the well. The tube will be sealed at its bottom end while inserted so that no free product can enter. This seal will be punctured before the test begins allowing the tube to fill with water . Because the top of the tube is open to the atmosphere, it will achieve static water-level conditions. A transducer probe

and cable will be lowered to the bottom of the tube. It is anticipated that both automatic transducer and manual electric tape measurements will be collected during the test. Because the tube acts as a well isolated from any free product accumulation, the water levels can be used to monitor the response of the formation to pumping without the need to account for the specific gravity of the free product.

The drop tube method will only be used in the three observation wells around each pumping well. The background wells will be measured in the conventional way by electric tape. At the beginning of the test and periodically during the test, measurements will also be taken with an interface probe in order to record any change in free product accumulation. The known specific gravity of the free product will be used to correct the water level and calculate the true drawdown at the background well.

We propose to run the test for 48 hours (approximately 3000 minutes) according to the following monitoring schedule:

0-1 hour Measure drawdown manually in observation wells as often as possible (time will also be spent on verifying that the discharge rate is constant, so that the automatic data logger measurements will be most useful during this first hour).

1-2 hours Manually measure drawdown in observation wells every 15 minutes; every 30 minutes in background wells.

2-4 hours Manual measurements in observation wells every 30 minutes, in background wells every hour.

4-12 hours Manual measurements in observation and background wells every two hours.

12-48 hours Manual measurements in observation and background wells every four to six hours.

The discharge rate will be tested every two hours after initial flow stabilization in order to verify that it is as constant as possible over the full 48 hours of pumping.

RECOVERY TEST

After the pumping is stopped, recovery will be monitored for 24 hours in observation and background wells according to the following schedule of manual measurements:

0-1 hour As often as possible

1-2 hours Every 30 minutes

2-12 hours Every two hours

12-24 hours Every six hours

The manual measurements will supplement the results provided by the automatic data loggers. Barometric pressure will be observed on-site every two to four hours during discharge and recovery. The Keck™ interface probe will be used to determine the thickness of free product in background wells four times a day during a round of manual water-level measurements. The times of any railroad stock traffic on the siding that abuts the site will be carefully noted during the pumping test and recovery period.

SECOND CONSTANT RATE PUMP TEST

The second aquifer pumping test will be performed in the less transmissive location of the pair of selected locations. The vacuum-enhancement technology will be used for this test. The procedure

for conducting the second test is the same as the first, with the exception that the well head at the pumping well will be sealed and blowers will be used to establish a new static condition four to six hours before the start of pumping. The new steady-state condition will be verified by determining that water levels are stable in the observation wells surrounding the pumping well. The blowers will be operated during the background period, the discharge period and also during recovery.

The enhanced drawdown possible in the recovery well with an applied vacuum of four to eight feet of water should allow a rate of 0.2 gpm to be maintained (the lowest rate for which it is generally feasible to keep discharge constant). Figure 5 shows the expected drawdown pattern at the observation wells for this pumping rate and the following assumed parameter values: a horizontal K of $5x10^{-5}$ cm/sec, an initial saturated thickness of 10 feet, an anisotropy of 10, and a specific yield of 0.10. For this lower transmissivity situation, the expected behavior of the drawdown curves is very different from the relatively high transmissivity case. The early-time drawdown curve, dominated by the release of water from elastic storage, lasts for approximately the first one to two hours of the test. After that, the delayed yield from the water table flattens the drawdown curve for an extended period of time. It is evident from these curves that under the assumed conditions an extension of the pumping portion of the test from two days to three days would add little information.

It appears that for the low transmissivity case, the collection of early-time data is necessary to derive an estimate of transmissivity and specific yield values in the area of the pumping well. The combination of automatic and frequent manual measurements should allow this part of the curve to be assembled.

GROUNDWATER SAMPLING

Groundwater samples will be collected from each of the two test wells prior to the start of the step test, and then after 24 and 48 hours of the constant rate pumping tests. The groundwater samples will be analyzed for benzene, ethylbenzene, toluene and xylenes (BTEX) using SW-846 Method 8020 and polynuclear aromatic compounds (PNAs) using SW-846 Method 8310. In addition to BTEX and

PNAs, each of the groundwater samples collected during the aquifer pumping tests will be analyzed for the general water quality parameters listed in Table 1. Data on the levels of these general water quality parameters present in the recovered groundwater will be used to evaluate pretreatment requirements and disposal alternatives. The general water quality parameters will be analyzed for using the methods described in "Standard Methods for the Examination of Water and Waste Water, 18th edition (1992)." The standard methods for each of the general water quality parameters are also listed in Table 1.

ANALYSIS OF PUMPING TESTS

The drawdown and recovery data at the observation wells will be "cleaned up" to eliminate spurious trends associated with regional water table fluctuations, barometric changes, and river stage movement. The background wells, barometer readings, and river stage recorder will be used to identify these trends. They will then be subtracted from the drawdown and recovery curves.

In the case of the barometric correction, an initial correlation of barometric changes with water-level changes in the background period will be used to estimate the barometric efficiency of the wells on-site. It is understood that this procedure will only work if other background trends are absent or can be accounted for independently.

Train traffic can also introduce extra drawup or drawdown by changing the total stress on the aquifer and, therefore, causing water to be released to enter into storage. This effect cannot easily be accounted for by analytical or numerical analysis. However, if the time of the traffic is known, an attempt can be made to eliminate from analysis the portion of the data affected.

Given the proximity of the observation wells to the pumping wells, it is reasonable to expect that whatever stresses unrelated to the pumping test occur, they will be small in comparison to the pumping test signal.

A variety of techniques will be used to analyze the pumping test data gathered from the observation wells. The discharge portion of the test will be examined using the log-log type curve techniques proposed by Neuman for anisotropic, unconfined aquifers in the presence of partially penetrating wells pumping and/or observation wells. The recovery portion of the test will be analyzed by the semi-log method. Because recovery restores the saturated thickness of the well, Dupuit assumptions can be invoked and a Jacob analysis applied to the straight-line portion of the late-time portion of the data (Neuman, "Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Gravity Response", 1975). In the case when late time is achieved, this method yields probably the most reliable estimate for transmissivity and, given an estimate of thickness over which the flow occurs, the horizontal K.

While the Neuman technique allows consideration to be taken of unconfined, anisotropic partially-penetrating conditions on drawdown in observation wells, it does not allow consideration of other factors such as leakage from below the screened portion of the aquifer, permeability zones which disturb radial flow patterns, or boundary effects associated with the presence of the river. It also cannot accommodate fluctuations in the pumping rate should they occur. A numerical model such as the USGS three-dimensional groundwater flow code MODFLOW™ can accommodate these complications. If warranted, it will be used to back out the parameters transmissivity, horizontal K, vertical K, elastic storage, and specific yield from the pumping test data. If there appears to be a recharge boundary associated with the river, then an additional parameter, river-bed conductance, will need to be estimated. If the pattern of response in the observation wells suggests non-radial flow patterns, then an attempt will be made to deduce the heterogeneity conditions that control the flow.

The grid of the numerical model will be constructed so as to accommodate the radius of the pumping well, the precise distances to the observation wells, and the presence of the river boundary.

REFERENCES

Geraghty & Miller, Inc. 1994a. Work Plan Phase II Site Investigation, Navistar International Transportation Company/Burlington Northern Railroad/Iowa Interstate Railroad Properties, Rock Island, Illinois, June 1994.

Geraghty & Miller, Inc. 1994b. Phase II Site Investigation Report, Navistar International Transportation Company/Burlington Northern Railroad/Iowa Interstate Railroad Properties, Rock Island, Illinois, September 1994.

TABLES

Table 1. List of General Water Quality Parameters, Navistar/BNR/IIR Site, Rock Island, Illinois.

Parameter	EPA Method	Holding Time	Preservative
Total Organic Carbon (TOC)	415.1	28 days	H2S04 to pH<2
Iron (Dissolved & Total)	236.1	6 months	HNO3 to pH <2
Manganese	243.1	6 months	HNO3 to pH <2
Calcium	200.7	6 months	HNO3 to pH <2
Magnesium	200.7	6 months	HNO3 to pH <2
Total Hardness	130.1	6 months	HNO3 to pH <2
Alkalinity	310.1	14 days	cool, 4 C
Total Suspended Solids (TSS)	160.2	7 days	cool, 4 C
Total Dissolved Solids (TDS)	160.1	7 days	cool, 4 C

Note: EPA Methods listed in 40 CFR 136 - EPA Regulations on Test Procedures for the Analysis of Pollutants.

CIO299.005\TABLE_1.

FIGURES

DRAFTER: ELS | APPROVED: | CHECKED: DF | DRAWING: 12 | FILE NO.: 1343 | PRJCT NO.: CI0299.004 | DWG DATE: 29MAR95

WATER EDGE

STAFF GUAGE

GM-20

SYLVAN SLOUGH

W-5

568.5

C-5

PROPOSED TRANSECT OF RECOVERY WELLS

MW-9

568.3

PROPOSED TREATMENT FACILITY

ABOVEGROUND STORAGE TANK

568.4

E-5

MW-6

568.6

566.9

GM-7

GM-6

GM-5

568.6

MW-8

566.9

562.9

GM-1

GM-2

GM-3

562.7

568.3

GM-4

MW-5

565.5

GM-9

564.5

GM-10

N

0 50 100 200

SCALE IN FEET

LEGEND

E-5 ⊕ PROPOSED TEST BOREHOLE LOCATION

GM-20 ⊙ PROPOSED MONITORING WELL LOCATION

MW-9 ◓ EXISTING MONITORING WELL LOCATION

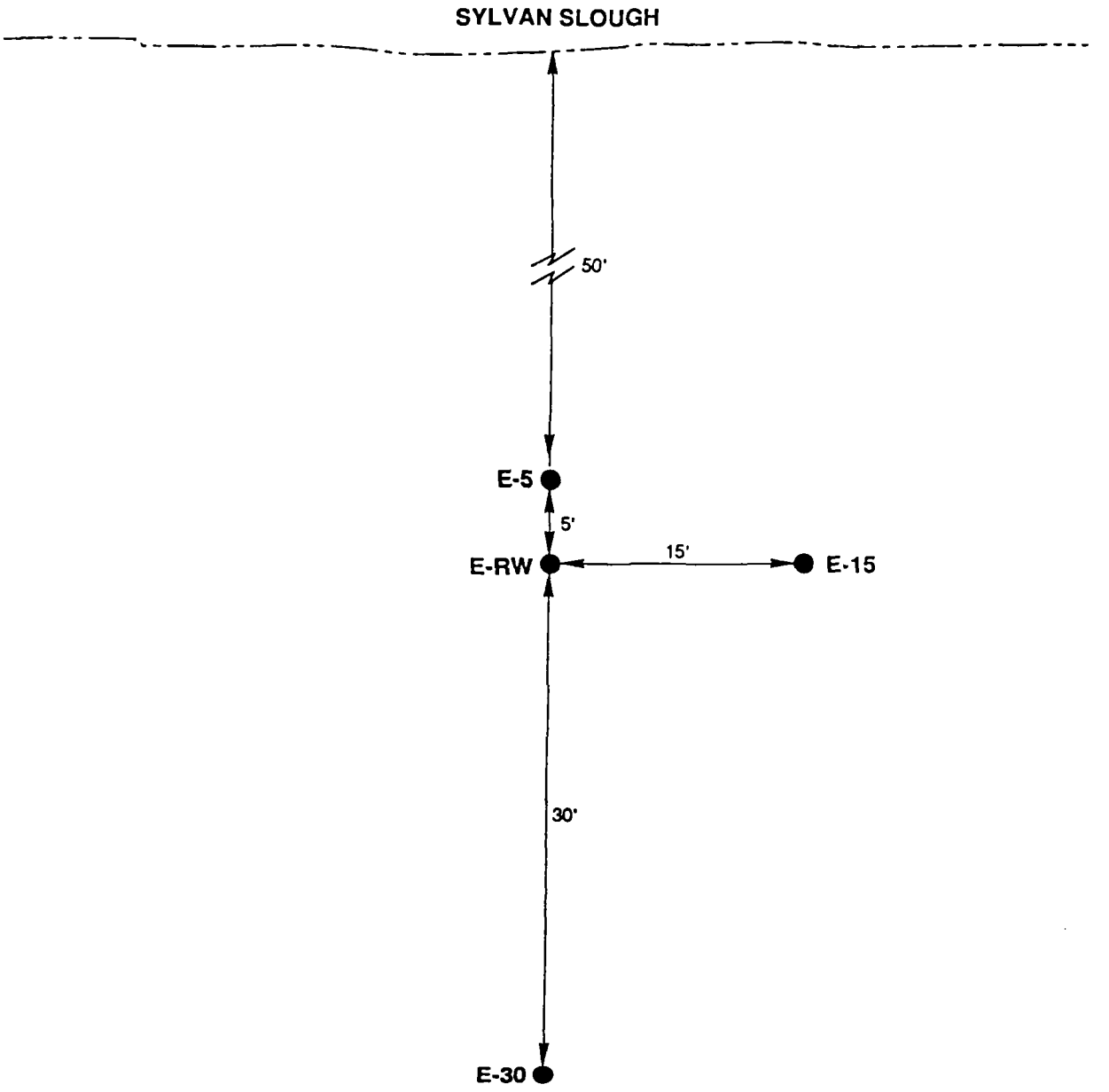
❖ PROPOSED STAFF GUAGE LOCATION

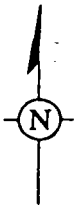
GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

TEST BOREHOLE LOCATIONS

NAVISTAR/BNR/IIR SITE
ROCK ISLAND, ILLINOIS

FIGURE
1





0 5 10 20

SCALE IN FEET

DRAFTER: ELS | APPROVED: | CHECKED: DF | DRAWING: 14 | FILE NO.: 1343 | PRJCT NO.: C10299.004 | DWG DATE: 29MAR95

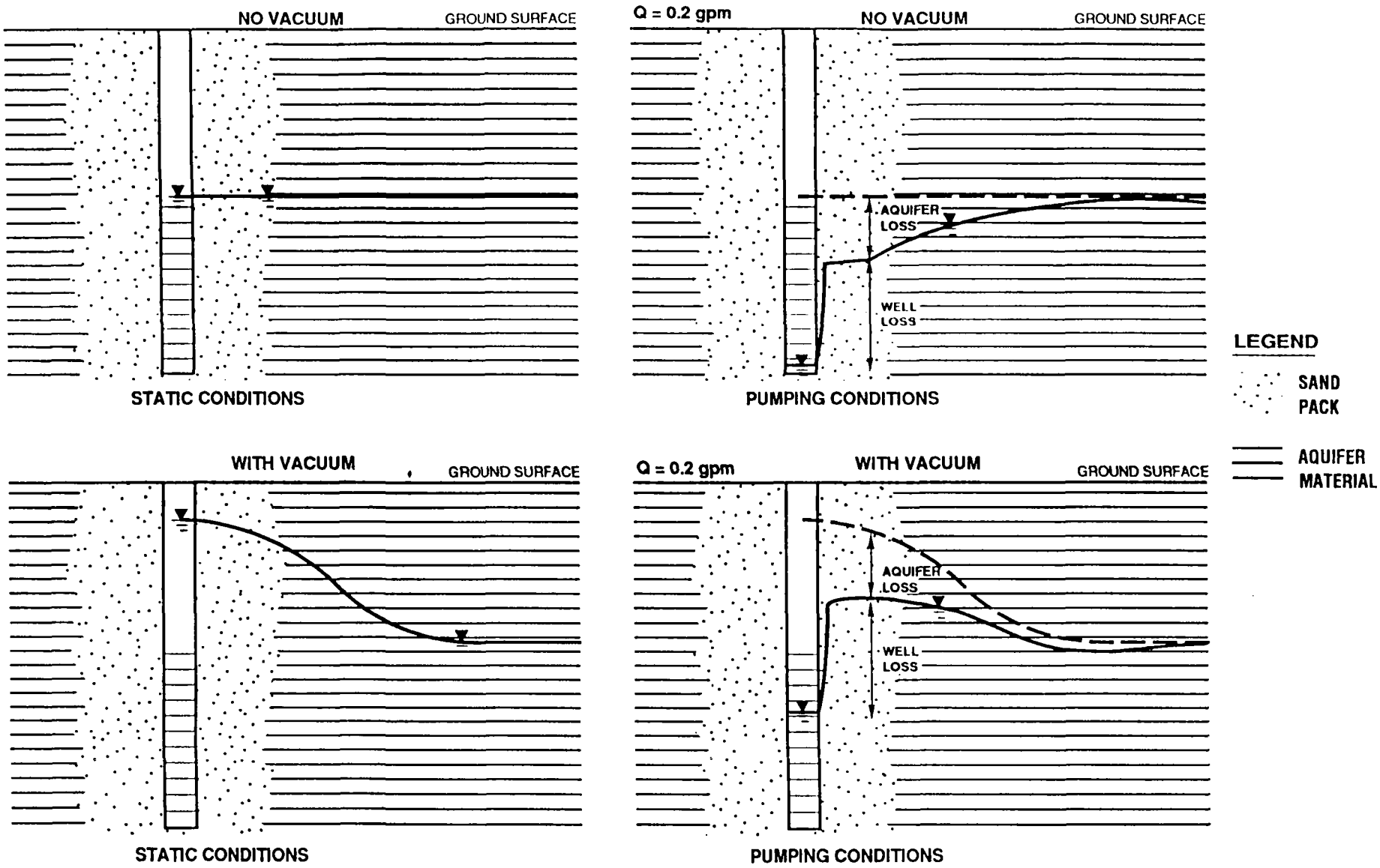
GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

PROPOSED CONFIGURATION OF OBSERVATION WELLS AROUND PUMPING WELL E-RW

NAVISTAR/BNR/IIR SITE
ROCK ISLAND, ILLINOIS

FIGURE
2

DWG DATE: 30MAR95	PRJCT NO.: C10299.004	FILE NO.: 1343	DRAWING: 17	CHECKED: DF	APPROVED:	DRAFTER: ELS

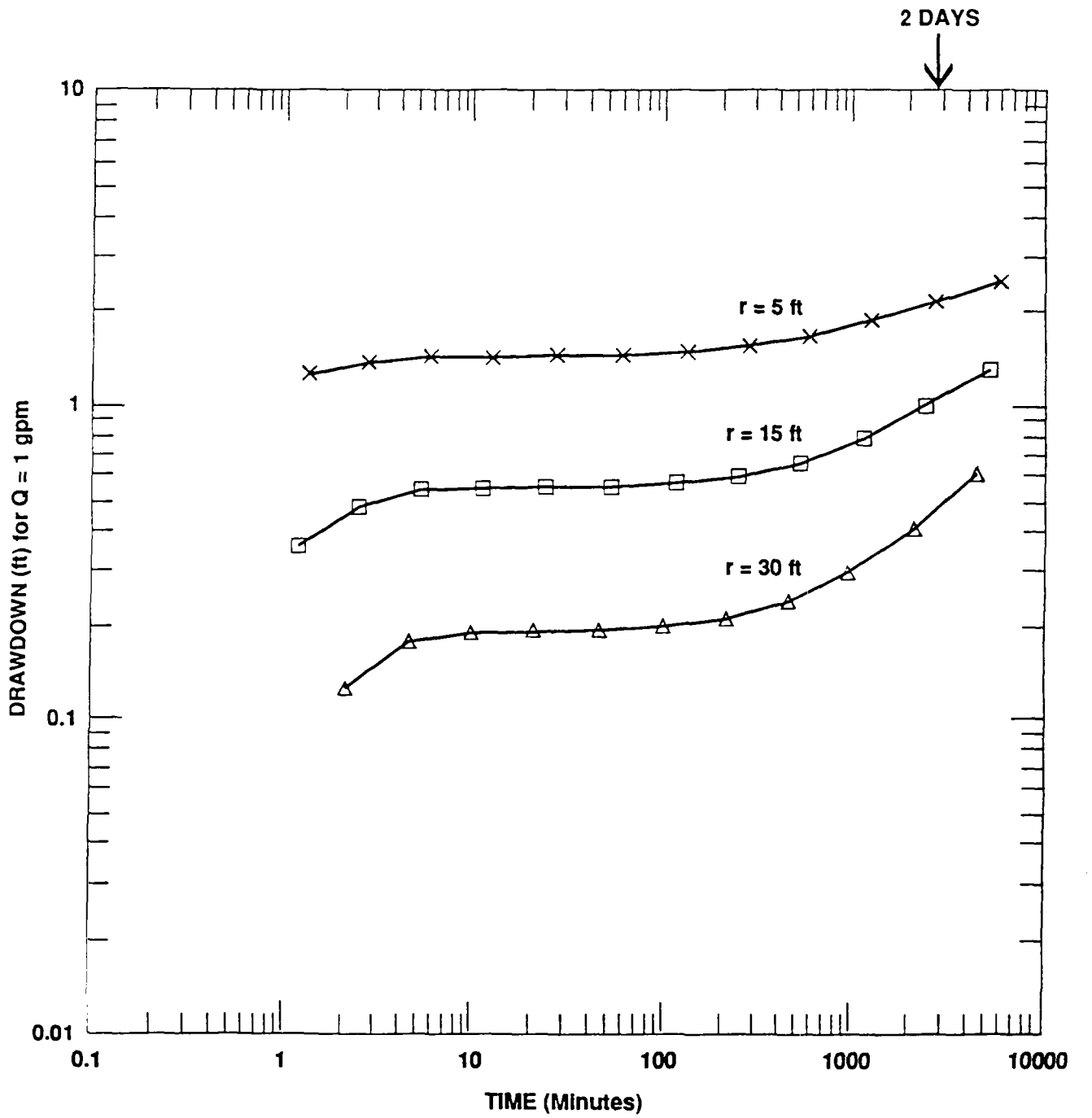


GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

EFFECT OF IMPOSED VACUUM ON DRAWDOWN AT THE WELL

NAVISTAR/BNR/IIR SITE
ROCK ISLAND, ILLINOIS

FIGURE
3



NOTE: Assumed Parameter Values are

Q = 1 gpm
K = 1e-3 cm/sec
THK = 10 ft
STORAGE = 1e-4
Sy = 0.1
ANISOTROPY = 10

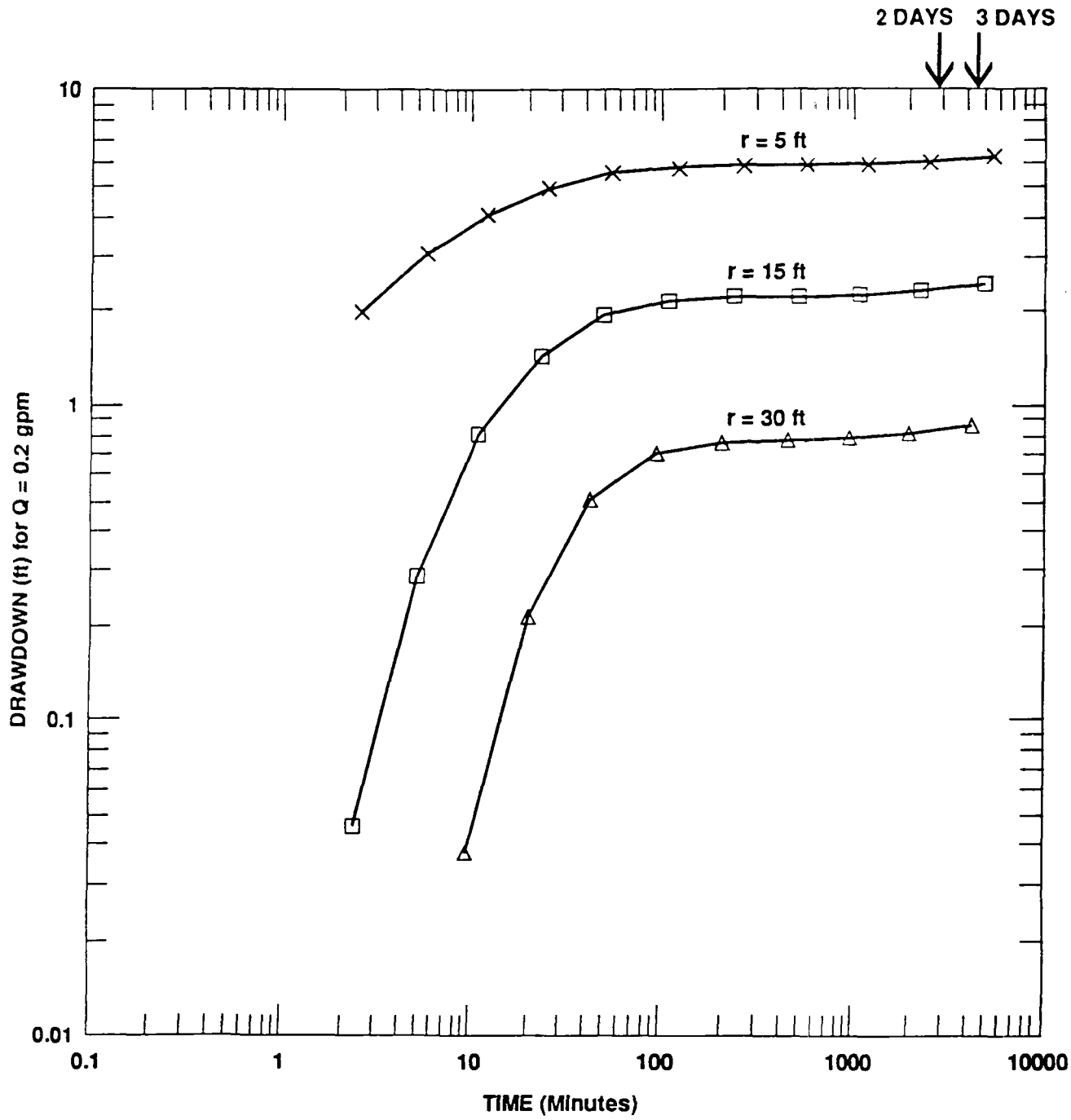
DRAFTER: ELS | APPROVED: | CHECKED: DF | DRAWING: 16 | FILE NO.: 1343 | PRJCT NO.: CI0299.004 | DWG DATE: 29MAR95

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

PREDICTED DRAWDOWN FOR HIGH TRANSMISSIVITY CASE

NAVISTAR/BNR/IIR SITE
ROCK ISLAND, ILLINOIS

FIGURE
4



NOTE: Assumed Parameter Values are

Q = 0.2 gpm
K = 5e-5 cm/sec
THK = 10 ft
STORAGE = 1e-4
Sy = 0.1
ANISOTROPY = 10

DRAFTER: ELS | APPROVED: | CHECKED: DF | DRAWING: 15 | FILE NO.: 1343 | PRJCT NO.: CI0299.004 | DWG DATE: 29MAR95

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

PREDICTED DRAWDOWN FOR LOW TRANSMISSIVITY CASE

NAVISTAR/BNR/IIR SITE
ROCK ISLAND, ILLINOIS

FIGURE
5

APPENDIX A

ADDENDUM TO SAMPLING AND ANALYSIS PLAN

ADDENDUM TO SAMPLING AND ANALYSIS PLAN
NAVISTAR INTERNATIONAL TRANSPORTATION CORPORATION/
BURLINGTON NORTHERN RAILROAD/
IOWA INTERSTATE RAILROAD PROPERTIES
ROCK ISLAND, ILLINOIS

April 1995

Submitted to:

United States Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Submitted by:

Navistar International Transportation Corporation
455 North Cityfront Plaza Drive
Chicago, Illinois 60601

and

Burlington Northern Railroad
4105 Lexington Avenue, Suite 300
Arden Hills, Minnesota 55126-6181

Prepared by:

Geraghty & Miller, Inc.
35 East Wacker Drive
Suite 1000
Chicago, Illinois 60601

CONTENTS

Page

INTRODUCTION 1

PRE-AQUIFER TESTING FIELD WORK 1

SLUG TESTING PROCEDURES 2

AQUIFER PUMP TESTING 3

AQUIFER STEP TEST 3
CONSTANT RATE PUMP TEST 4

Pump Test Field Procedures 4
Pump Test Sampling 7

RECOVERY TEST 8

DISPOSAL OF EXTRACTED GROUNDWATER 8

ANALYSIS OF PUMP TEST DATA 9

INTRODUCTION

The purpose of this Addendum is to supplement the Sampling and Analysis Plan presented in the approved June 1994 Phase II Site Investigation Work Plan. The Addendum outlines the field procedures to be employed during the performance of the aquifer testing at the Navistar International Transportation Corporation (Navistar), Burlington Northern Railroad (BNR), and Iowa Interstate Railroad (IIR) properties (the Navistar/BNR/IIR site) in Rock Island, Illinois. Activities described in this Addendum address the additional studies that are necessary prior to proceeding forward with the design of the proposed recovery well network presented in the September 1994 Draft Phase II Site Investigation Report.

The following sections describe the procedures associated with the pre-aquifer testing field work, the performance of slug tests, aquifer step tests, constant rate aquifer pump tests, and recovery tests, and the disposal of extracted groundwater.

PRE-AQUIFER TESTING FIELD WORK

Prior to conducting the aquifer testing at the Navistar/BNR/IIR site, a series of test borings and wells will be completed. The conceptual design of the proposed recovery well network consists of eight recovery wells spaced equidistant from each other along the northern boundary of the Navistar/BNR/IIR site, located immediately along the southern bank of the Sylvan Slough. Three test borings (E-5, C-5, and W-5) will be advanced in the area of the proposed line of recovery wells to characterize the hydrogeology near the water table in an effort to install the pump test wells in locations likely to have the highest and lowest transmissivity, respectively. The three test borings will be completed as monitoring wells to be used as observation points for the aquifer testing procedures.

Along with the three initial test borings, Geraghty & Miller will install an observation well (GM-20) along the Sylvan Slough and an automatic staff gauge within the Sylvan Slough to monitor the changes in the river stage during the pump test. Following the slug tests conducted at the three test boring locations, Geraghty & Miller will install two, four-inch pumping wells and four additional

observation wells. The field procedures for the slug tests to be performed as part of the pre-design aquifer testing are discussed in a later section of this Addendum.

As a result, a total of two pumping wells and eight observation wells will be completed at the Navistar/BNR/IIR site prior to conducting the aquifer pump test. The field procedures to be employed by Geraghty & Miller for soil boring advancement, split-spoon soil sampling, well construction, well development, and water-level data recording will be the same as those provided in the June 1994 Phase II Site Investigation Work Plan. The only differences to the referenced field procedures involves the types of materials that will be used for well construction and the type of water-level recorder that will be used for measuring the water-table elevation.

The pumping and observation wells to be installed prior to the completion of the aquifer testing will be constructed with Schedule 40 polyvinyl chloride (PVC) casing and well screen. The Phase II Site Investigation Work Plan called for the use of stainless steel well screens, rather than PVC well screens.

Geraghty & Miller will record water-level measurement with the use of a Keck™ interface probe. The use of an interface probe will allow Geraghty & Miller to record both the thickness of free product within a particular well and the water-level elevation. The procedures used for the recording of water-level data with the interface probe will be essentially the same as those outlined in the June 1994 Phase II Site Investigation Work Plan with the exception of the free product measurement.

SLUG TESTING PROCEDURES

This section describes the field procedures to be utilized by Geraghty & Miller during the performance of the slug tests at the three test wells installed in the area of the eight recovery wells proposed in the conceptual design. Slug tests are a method of obtaining approximate value of hydraulic conductivity in the immediate vicinity of the well screen through the use of a single well.

The slug test is performed by quickly displacing a volume of water in the well with an inert solid object (slug) and recording the subsequent change in water levels over time as the water level recovers to static conditions. To ensure that accurate results are achieved by the slug testing procedure, two tests will be performed at each of the test monitoring well locations (E-5, C-5, and W-5). The first test will consist of the introduction of a slug into the well (slug in), and the second will consist of the removal of the slug from the well (slug out). A Hermit™ In-Situ Model SB1000B or SB1000C automatic data logger and pressure transducer will be used to measure and record changes in the water levels during both tests. The water-level data will then be analyzed by the Bouwer and Rice method to determine the hydraulic conductivity value.

AQUIFER PUMP TESTING

This section describes the field procedures to be utilized by Geraghty & Miller during the performance of the aquifer step tests, constant rate aquifer pump tests, and aquifer recovery tests.

AQUIFER STEP TEST

Consecutive aquifer step tests will be performed initially at each pumping well as a means of assessing the well efficiencies and selecting an appropriate sustainable discharge rate for the constant rate aquifer pump test. Prior to the step test, static water-level measurements will be obtained for 24 hours at 10 minute intervals using Hermit™ automatic water-level data loggers at the pumping well, three local observation wells (located 5 feet north, 15 feet east or west, and 30 feet south of the pumping well), background monitoring wells (Monitoring Wells GM-20, MW-6, MW-8, and MW-9), and the Sylvan Slough staff gauge. These data will provide information for a baseline hydrograph and a basis for correcting the data obtained should any external influence be suspected.

Depending on the type of material penetrated by the pumping wells, the aquifer step tests will be conducted at rates of 0.2, 0.5, 1.0, 2.0, and 5.0 gallons per minute (gpm). Each specific pumping

rate will be maintained for approximately 20 minutes. During the aquifer step test, each pumping rate will be maintained until groundwater drawdown stabilizes.

It is possible that a pumping test conducted in relatively impermeable material will not sustain a pumping rate of 0.2 gpm, the lowest rate that can be continuously discharged with available pumps. With this possibility, Geraghty & Miller will use a vacuum-enhanced discharge system to conduct the aquifer step test at the less transmissive pumping well location. The advantage of this procedure is that it allows for greater drawdown in the well, thereby, counteracting inefficiency. It also preserves the saturated thickness around the well that is important when trying to maximize pumping from wells in unconfined aquifers. The vacuum will be applied by two Rotron™ regenerative blowers with a combined capacity of 100 inches of water.

After completion of the step test, the data will be reduced and evaluated to estimate the pumping rate required for the constant rate pumping test. Data obtained during the aquifer step test will be plotted as a graph of groundwater elevation versus time for various pumping rates. The groundwater extraction rate for the constant rate pump test will be based on the maximum sustainable groundwater extraction rate obtained during the aquifer step test.

CONSTANT RATE PUMP TEST

This section discusses the field procedures that will be followed and types of samples that will be collected during the performance of each of the two aquifer constant rate pump tests.

Pump Test Field Procedures

The two pumping tests will be performed consecutively. The pumping well location characterized by the more permeable deposits will be tested first. The equipment used to conduct the constant rate pump test will include the pump (with check valve), flow control valve, discharge line, barometer, rain gauge, Hermit™ automatic data loggers, and pressure transducers. It is estimated that the duration of each constant rate pump test will be 48 hours. If it is determined during the constant

rate pump test that a modified duration of the test is necessary, such a modification will be implemented.

The pump tests will be conducted consecutively at the two, 4-inch diameter pumping wells with drawdowns monitored in the three local observations wells located about each pumping well (5 feet north, 15 feet east or west, and 30 feet south of each pumping well), background monitoring wells (Monitoring Wells GM-20, MW-6, MW-8, and MW-9, and the Sylvan Slough staff gauge. The water-levels will be monitored at the pumping well, three local observation wells, background wells, and Sylvan Slough staff gauge approximately 24 hours prior to start of the constant rate pump test to identify background water-level trends.

A Hermit™ automatic data logger and series of pressure transducers will be utilized to automatically monitor and record incremental changes in water level as the test proceeds in the pumping well, three local observation wells, background well GM-20, and the Sylvan Slough staff gauge. At the remaining background monitoring well locations, the water levels will be recorded manually by Geraghty & Miller personnel using a combination of electronic water-level indicators and a Keck™ interface probe. The water-level indicators and interface probe will be checked for accuracy prior to commencement of the tests. Periodic manual water-level measurements will also be conducted in the wells that have are equipped with pressure transducers to verify the accuracy of the data being mechanically collected.

The pumping equipment will include a submersible pump and motor capable of pumping at a rate of up to 480 gpm. The pump will be equipped with a check valve, a throttling valve and a flow meter to measure flow rate. Water-level measurement and instrument reading techniques will be consistent for all on-site personnel.

As indicated above, water-levels will be monitored for a period of 24 hours prior to the start of each pump test. Each constant rate pump test will be conducted over a 48-hour period or

approximately 3,000 minutes. Geraghty & Miller will monitor the water-levels in the pumping well, three local observation wells, background monitoring wells, and Sylvan Slough staff gauge in accordance with the following monitoring schedule:

0 to 1 hours: Drawdown will be measured manually in the three local observation wells and background monitoring wells as often as possible.

1 to 2 hours: Drawdown will be measured manually in the three local observation wells every 15 minutes, and every 30 minutes in the background monitoring wells.

2 to 4 hours: Drawdown will be measured manually in the three local observation wells every 30 minutes, and every 60 minutes (hour) in the background monitoring wells.

4 to 12 hours: Drawdown will be measured manually in the three local observation wells and background monitoring wells every 2 hours.

12 to 48 hours: Drawdown will be measured manually in the three local observation wells and background monitoring wells every 4 to 6 hours.

The predetermined constant groundwater flow rate will be maintained during the entire test. The pump and discharge rate will be monitored continuously for the first few minutes of the pump test and at 10 minute intervals during the first hour so that the automatic data logger measurement will be most useful during the first hour. After the first hour, the discharge rate will be monitoring at 1 to 2 hour intervals to verify the flow rate during the remainder of the test.

After the pumping is stopped, groundwater recovery will be monitored for a period of 24 hours in the three local observation wells and background monitoring wells. Details of the groundwater

recovery monitoring procedures are provided in the *Groundwater Recovery Monitoring* section of this document.

The second aquifer pump test will be performed in the less transmissive of the two pumping wells. Vacuum-enhancement technology will be utilized during the aquifer pump test at this location. The procedure for the performance of the aquifer pump test will be the same as the procedures presented previously in this section with the exception of applying a vacuum to the pumping.

Two Rotron™ blowers will be used to apply the vacuum to the pumping well. The blowers will be activated approximately 24 to 36 hours prior to the start of the pump test to establish a new static condition. The blowers will be applying a vacuum during all phases of the aquifer pump test: background monitoring; active pumping (or discharge) condition; and groundwater recovery monitoring. As stated previously, with the exception of the applied vacuum, the second constant rate pump test will be performed using the same field procedures that were employed during the pump test conducted at the pumping well exhibiting a higher transmissivity.

Pump Test Sampling

Groundwater samples will be obtained at 1 hour, 24 hours, and 48 hours into each constant rate pump test. A sampling tap will be installed in the discharge line used during the constant rate pump test to enable collection of groundwater samples at the higher pumping rate. Care will be taken to ensure that water enters the sample containers at sufficiently slow rates in an effort to minimize oxygenation and turbulence of the samples. The groundwater samples will be submitted for laboratory analyses of benzene, ethylbenzene, toluene, and xylenes (BETX), polynuclear aromatic hydrocarbons (PNAs), iron (total and dissolved), hardness (as calcium carbonate), total dissolved solids, calcium, magnesium, alkalinity, manganese, total suspended solids, and total organic carbon. These data will provide useful information with respect to design of a groundwater treatment system for the site.

Air emission samples will also be obtained at 1 hour, 24 hours, and 48 hours into each constant rate pump test. The air samples will be submitted for laboratory analyses of volatile organic compounds (VOCs), and PNAs.

Sampling, chain-of-custody, and quality assurance/quality control (QA/QC) procedures to be followed are presented in the approved June 1994 Phase II Site Investigation Sampling and Analysis and Quality Assurance Project Plans.

RECOVERY TEST

After the constant rate pump test is completed, Geraghty & Miller will continue to monitor water-levels for approximately 48 hours while the aquifer is undergoing recovery from the pump test. The water-level monitoring procedures to be utilized during the groundwater recovery period consist of the following:

- Final readings for the pumping phase will be obtained followed by shutdown of the pump and motor.

- The automatic water-level recorders will be reset to record recovery data.

- Recovery water-levels will be measured at the pumping well, three local observation wells, background monitoring wells, and Sylvan Slough staff gauge at the same intervals that were employed during the pumping phase.

DISPOSAL OF EXTRACTED GROUNDWATER

The discharge location for the extracted groundwater will be determined after the location of the pumping wells have been finalized. Disposal options will be dependent on the concentrations of potentially hazardous constituents that may be contained in the extracted groundwater. Laboratory

analyses of the extracted groundwater for chemical characteristics will be performed during the aquifer step test. Based on these results, approval for the discharge of the extracted groundwater to the local municipal sanitary sewer will be sought from the City of Rock Island and/or appropriate local authority. Dependent upon arrangements that can be made with the local municipal sanitary sewer authority, the extracted groundwater will either be discharged directly to a sanitary sewer or contained on-site in a 20,000-gallon frac tank and batch-discharged to the sanitary sewer system.

If approval is not received by the City of Rock Island for discharge to the municipal sanitary sewer system, the extracted groundwater will be collected on-site in a 20,000-gallon frac tank. Arrangements will then by made with a local contractor to transport the extracted groundwater to a local, regulated wastewater disposal facility.

Copes of all wastewater discharge permit and approval documentation, including manifests, will be provided to the USEPA upon request.

ANALYSIS OF PUMP TEST DATA

Based on assumed aquifer parameters, the results of the two constant rate pump tests will be sufficient to compute the properties of the aquifer (transmissivity, specific yield, and hydraulic conductivity) underlying the Navistar/BNR/IIR site. During the pump tests, the drawdowns measured in the field will be plotted in the form of hydrographs, and then evaluated using a variety of techniques. A complete discussion of the techniques that will be utilized to interpret the results of the two aquifer pump test are provided in the main text portion of this Aquifer Test Work Plan.

APPENDIX B

SITE ACCESS AGREEMENT
L.R.C. DEVELOPERS, INC.

SITE ACCESS AND RELEASE AGREEMENT

This SITE ACCESS AND RELEASE AGREEMENT is made and entered into on this 1st day of July, 1994 by and among GERAGHTY & MILLER, INC., a Delaware corporation, hereinafter referred to as "Consultant"; and Navistar International Transportation and Burlington Northern Railroad, hereinafter referred to as "Clients", and together with Consultant, hereinafter referred to as "Undersigned"; and L.R.C. Developers, Inc., hereinafter referred to as "Owner".

WHEREAS, Undersigned desires access to the site described in Exhibit B, attached hereto, hereinafter referred to as "Site", to engage in the activities specified in Exhibit A, attached hereto;

NOW, THEREFORE, in consideration of the premises and the mutual covenants herein contained and intending to be legally bound, the parties agree as follows:

1. Site Access

Owner hereby grants permission to Undersigned to enter the Site and engage in the activities specified in Exhibit A.

2. Release

As consideration for being afforded access to Site, Undersigned hereby releases Owner, its parent & subsidiaries, affiliates and their respective shareholders, directors, officers, and agents from all present or future claims, causes of action, or demands that Undersigned now has or may hereafter accrue on account of or in anyway growing out of any and all known and unknown, or seen and unforseen bodily and personal injuries or property damage and the consequences thereof resulting or which may result from Undersigned's presence upon the Site or the use of any equipment or procedures while on, entering, or leaving the Site. Claims arising out of existing site conditions, negligence or willful misconduct of Owner, its parent and subsidiaries, affiliates, and their respective shareholders, directors, officers and agents are excluded from this Release.

Navistar International Transportation Corporation

By: Edith M. Arrieta

Title: Director, Environmental Affairs

Burlington Northern Railroad

By: Greg Fithian

Title: Manager Env. Operations

GERAGHTY & MILLER, INC.

By: Gregg L. Vanderlaan

Title: Associate

L.R.C. Developers, Inc.
[Owner]

By: Jon L. Christiansen

Title: President

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUL 11 1994

REPLY TO THE ATTENTION OF:
H-7J

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Frederic Yocum, President
Iowa Interstate Railroad
800 Webster Street
Iowa City, Iowa 52240

Dear Mr. Yocum:

This letter is to confirm the United States Environmental Protection Agency's (U.S. EPA's) designation of Burlington Northern Railroad Company (BNRR) and Navistar International Transportation Corporation (Navistar), their officers, employees, agents, contractors, and consultants as its authorized representative solely for the purposes of access in accordance with the work defined in the Work Plan, which has been approved by U.S. EPA with the inclusion of the comments of July 6, 1994, in the Administrative Order on Consent (AOC), Docket No. V-W-94-C-242 between U.S. EPA, BNRR and Navistar for the Sylvan Slough site located at 3000 - 3500 Fifth Avenue in Rock Island, Illinois, and in any future amendments or modifications of the Work Plan in accordance with the AOC.

U.S. EPA is authorized to designate BNRR and Navistar as its representatives pursuant to Section 311(m) of the Clean Water Act (CWA), 33 U.S.C. § 1321(m). The authority granted to the Administrator in the above-referenced section of the CWA was delegated to the Regional Administrators of the U.S. EPA on October 16, 1991, and was redelegated to the Director, Waste Management Division on September 17, 1992.

This letter additionally confirms BNRR's and Navistar's understanding that they are liable for expense incurred by the United States in obtaining access on behalf of BNRR and/or Navistar and BNRR's and Navistar's agreement to indemnify, save and hold harmless the United States for any and all claims related to acts or omissions of BNRR, Navistar, their officers, employees, agents, contractors, consultants or representatives as the authorized representative of U.S. EPA.

Sincerely,

Wm. E. Muno

William E. Muno, Director
Waste Management Division

cc: Jeffrey Cox (CM-29A)

Julie Zakutansky (HSE-5J)

Elizabeth Hill, Burlington Northern Railroad Company, Law Department, 3800 Continental Plaza, 777 Main Street, Fort Worth, Texas 76102

Cary Perlman , Latham & Watkins, Sears Tower, Suite 5800, Chicago, Illinois 60606

Julene Perbohner, Perbohner and Associates, 515 W. Jackson Street, Woodstock, IL 60098

CONSENT FOR ACCESS TO PROPERTY
SYLVAN SLOUGH SITE
ROCK ISLAND, ILLINOIS

Name: Iowa Interstate Railroad

Address of Property: 3000-3500 Fifth Avenue
Rock Island, Illinois (The "Property")

Iowa Interstate Railroad, Ltd. ("IAIS") an authorized representative of the owner of the subject Property, consents to officers, employees, contractors, and authorized representatives of the United States Environmental Protection Agency ("U.S. EPA") entering and having continued access to this Property for the following reasons and on the following conditions:

1. For the purpose of implementing the Work Plan for this site, which was reviewed by Burlington Northern Railroad, Navistar, and Iowa Interstate Railroad and which U.S. EPA is approving pending inclusion of the comments made on July 6, 1994, and any modifications to that Work Plan as required under the Administrative Order by Consent, Docket No. V-W-94-C-242; and

2. Provided that U.S. EPA, and their designated representatives shall inform the IAIS designated person(s) named below of the type, scope of work and time frame for the implamentation of the work plan at least 24 hours before the commencement of work; and

3. Provided that, if, in the course of implementing the Work Plan, U.S. EPA and/or its representatives determine that there is a discharge/release of oil which may pose an imminent and substantial endangerment to the public health, welfare, or the environment, U.S. EPA shall afford IAIS an opportunity to take any necessary response actions. If IAIS does not undertake the necessary response actions, U.S. EPA shall take any necessary actions to abate such endangerment to the public health, welfare, or the environment. If IAIS undertakes response activities, U.S. EPA and its representatives shall oversee and monitor such activities and IAIS shall be liable for the cost of such oversight and monitoring. If U.S. EPA determines that IAIS' activities are not adequate to deal with the endangerment which may be posed to public health, welfare or the environment, U.S. EPA shall take necessary actions to abate such endangerment;

IAIS realizes that these actions taken by U.S. EPA are undertaken pursuant to its response and enforcement responsibilities under the Clean Water Act, 33 U.S.C. § 2501 et seq.

This written permission is given by IAIS voluntarily, on behalf of IAIS and all other co-owners of this Property, with knowledge of its right to refuse and without threats or promises of any kind.

IOWA INTERSTATE RAILROAD:

July 11, 1994
Date

By: Frederic W. Yoeum Jr.
its President

Names and Phone Numbers of Designated Persons:

William J. Duggan, Vice-President Engineering (319)339-9540
Name and Title

George Noble, Outside Environmental Consultant (708)677-8410
Name and Title

Frederic W. Yoeum Jr., President (319)339-9501
Name and Title